PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 21015887	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/EP2004/009630	International filing date *(day/month/year)* 28.08.2004	Priority date *(day/month/year)* 05.09.2003
International Patent Classification (IPC) or national classification and IPC C08J3/24, C08L43/04, H01B3/44, F16L9/12		
Applicant BOREALIS TECHNOLOGY OY et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 2 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☒ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
05.04.2005	13.12.2005
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Otegui Rebollo, J Telephone No. +49 89 2399-8670

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/009630

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

   Description, Pages

   1-10 as originally filed

   Claims, Numbers

   1-16 received on 08.11.2005 with letter of 08.11.2005

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☒ the claims, Nos. 1,2
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/009630

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1-16
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-16
Industrial applicability (IA)	Yes:	Claims	1-16
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (SEPARATE SHEET)

International application No.
PCT/EP2004/009630

Re Item I
Basis of the report

The amendments filed with the letter dated 8 November 2005 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT. The amendments concerned are the following: the characterisation of claims 1 and 2 of the application by the features "the high pressure polyethylene has a density of > 928 kg/m^3" (claim 1) or "the high pressure polyethylene has a density of > 933 kg/m^3" (claim 2). The application as originally filed generally links these features with the high pressure polyethylene composition claimed, not with the high pressure polyethylene itself (see for instance claims 1 and 2 as originally filed and page 3, lines 3 to 12 of the application). Note that of the four high pressure ethylene-vinyltrimethoxysilane copolymers A to D disclosed in the application, only copolymer A shows a density > 928kg/m^3, which is incorporated into a composition also having a density > 928kg/m^3, and none of the copolymers B to D or the compositions containing them were designated as comparative (see examples and tables). Note also that on the basis of a particular example no general claim may be made after the filing date of the application.

Re Item V
Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The following documents are referred to in this report:

D1 : US 5 492 760 A (SARMA HARIDOSS ET AL) 20 February 1996 (1996-02-20)
D2 : EP 0 501 340 A (QUANTUM CHEM CORP) 2 September 1992 (1992-09-02)
D3 : US 5 430 091 A (MAHABIR CARL M) 4 July 1995 (1995-07-04)
D4 : US 4 117 195 A (MAILLEFER CHARLES ET AL) 26 September 1978 (1978-09-26)

The subject-matter of claims 1 to 16 of the present application appears to be novelty anticipated (Article 33(2) PCT) by the crosslinkable compositions and their uses for manufacturing pipes and cables disclosed in documents D1 to D4 (see passages cited in the search report). It is further pointed out that from the comments of prior art in the

application (see paragraph common to pages 1 and 2) it may be concluded that the claimed subject-matter is not novel (Article 33(2) PCT) because the incorporation of up to 30 wt-% of a high density polyethylene into the silane copolymer is in itself a preferred embodiment of the invention (see page 3 lines 20 to 23). Note also that the densities recited in the claims refer not to the high pressure polyethylene but to the compositions themselves. Therefore, any lower polymer densities of state of the art compositions may be routinely further increased by using typical additives in the art such as high density polymers, fillers or pigments to automatically come within the densities claimed. Furthermore, even if a distinguishable subject-matter from the disclosures of the cited documents is filed, such subject-matter would not involve an inventive step (Article 33(3) PCT) as a composition containing polymer B (see page 6, lines 26 to 29 and example 4) appears to solve the problem underlying the application while being outside the scope of the invention.

CLAIMS

1. A crosslinkable high pressure polyethylene composition containing ethylene silane copolymer resin having a content of silane of about 0.1 to 10 weight% and at least one silanol condensation catalyst, c h a r a c t e r i s e d in that the density of the high pressure polyethylene is >928 kg/m^3.

2. A crosslinkable high pressure polyethylene composition according to claim 1, wherein the density of the high pressure polyethylene is >933 kg/m^3.

3. A crosslinkable high pressure polyethylene composition according to claim 2, wherein the ethylene silane copolymer resin is an ethylene-vinyltriethoxysilane copolymer, an ethylene-gamma-methacryloxytriethoxysilane copolymer, an ethylene- vinyltrimethoxysilane copolymer or an ethylene-gamma-trimethoxysilane copolymer resin, preferably an ethylene- vinyltrimethoxysilane copolymer resin.

4. A crosslinkable high pressure polyethylene composition according to claim 3, wherein the ethylene- vinyltrimethoxysilane copolymer resin further comprises high density polyethylene in an amount of <40 weight%.

5. A crosslinkable high pressure polyethylene composition according to claim 4, wherein the amount of high density polyethylene is 15-35 weight%, preferably 20-30 weight%.

6. A crosslinkable high pressure polyethylene composition according to any of claims 1-5, wherein the MFR_2 at 190°C/2.16 kg is 0.1-100 g/10 min, more preferably 0.5-6 g/10 min and most preferably 1-4 g/10 min.

7. A crosslinkable high pressure polyethylene composition according to any of claims 1-6, wherein the elongation at break is >200% as measured according to ISO 527.

8. A crosslinkable high pressure polyethylene composition according to any of claims 1-7, wherein the ten-

sile strength at break is >12.5 MPa as measured according to ISO 527.

9. A crosslinkable high pressure polyethylene composition according to any of claims 1-8, wherein the gel content is >65 weight% as measured according to ASTM D 2765.

10. A crosslinkable high pressure polyethylene composition according to any of claims 1-9, wherein the polyethylene composition further comprises 0.1-2.0 weight% of a drying agent.

11. A process for the preparation a crosslinkable polymer composition according to any of claims 1-10 c h a r a c t e r i s e d in that the process is a high pressure process at a pressure above 1200 bar.

12. A process according to claim 11, wherein the polymer composition is crosslinked in the presence of a silanol condensation catalyst comprising a compound of formula (I):

$$ArSO_3H \quad (I)$$

or a precursor thereof, Ar being a hydrocarbyl substituted aromatic group comprising at least 14 carbon atoms.

13. A process according to claim 11, wherein the polymer composition is crosslinked in the presence of a silanol condensation catalyst, preferably dibutyl-tin-dilaurate.

14. A pipe made of a crosslinkable polymer composition according to any of claims 1-10.

15. A pipe according to claim 14, wherein the pressure resistance at 95°C is at least 2.8 MPa, more preferably 3.6 MPa and most preferably 4.4 MPa for a failure time of at least more than 1000 hours.

16. Use of a crosslinkable polymer composition according any of claims 1-10 as an insulation for a cable.